

ZOOPLANKTON COMMUNITY OF LAKE GBEDIKERE, BASSA, KOGI STATE, NIGERIA.

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ABSTRACT.

A qualitative study of zooplankton fauna was carried out monthly for ten months from three stations marked A, B and C on Gbedikere Lake with a standard Clarke – Bumped plankton sampler between February and November 2008. Twelve (12) species of zooplankton were identified. The major groups found were Rotifers, Cladocera and Copepoda, their percentage are as follows: 45%, 27% and 25% respectively. The species composition of zooplankton comprised of Rotifers (6), Cladocera (3) and Copepoda (3). The zooplankton community showed evident seasonal pattern and some of the physico-chemical factors that may be responsible for these were found in all three stations. Zooplanktons are also used as natural fish food for fish larvae in fish breeding for aquacultural development.

KEYWORDS: Species composition, seasonal variation, fish breeding.

INTRODUCTION

In natural ecosystems, zooplanktons occupy a strategic position in the food chain of aquatic organism. Ecologically, they have been shown exert tremendous influence on phytoplankton succession by means of selective grazing (Porter, 1977). They are also an important source of natural food for carnivorous and omnivorous fishes and are prepared over artificial food such as beans and groundnut cakes under experimental conditions (Kirk and Howel, 1972; Kinne, 1977). There has been no previous comprehensive study of zooplankton population in Gbedikere Lake. However, Adeyemi *et al.*, (2009) in their study of the food and feeding habits of *Synodontis resupinatus* in the lake, gave a check list of zooplanktons found in the stomach of this fish species.

Okayi *et al.*, (2001) in their studies the of seasonal pattern of zooplankton community of River Benue (Makurdi), reported that zooplankton consisted of Copepoda, (17.08%) Cladocera, (24.24%) and Rotifer, (12.5%) in the river.

Adeniji, (1978) also reported the zooplankton composition of I.I.T.A reservoir in Ibadan to hold 29.32/62.66 organisms/litters of zooplankton and 100-20, 700 organisms of zoobenthos.

Adeniji and Olowe, (1983) noted in their study of the vertical distribution of zooplankton in Jebba Lake that the zooplankton in the river was dominated by crustaceans. Ovie and Adeniji, (1994) identified a total of twenty six species of pelagic zooplankton in Shiroro lake (Sokoto).

The community structure and ecological role of pelagic zooplankton in natural and man made lakes and rivers are of great concern to aquatic productivity and especially fish production. In view of their grazing activities and their role in nutrient recycling zooplankton potentially have both subtle and gross effects on phytoplankton populations which in turn have an effect on water quality (Mavuti, 1990).

Zooplanktons are important food items for many larvae and same adults of many fish species which constitute an important component of human diet in development countries. The species composition of lake and river zooplankton is influenced by physical, chemical, biological and geographical factors among lakes. Environmental stress can operate in association with these factors to alter species composition. The aim of this study is to determine the composition and abundance of zooplanktons in Gbedikere Lake.

MATERIALS AND METHODS

The study was carried out monthly for the period of ten months between February and November 2008 in Gbedikere Lake. Lake Gbedikere is a natural lake located between Latitudes 3⁰24^N and Longitudes 5⁰14^E and is about 10km to the East of Oguma the Headquarter of Bassa Local Government Area of Kogi State.

Water enters the Lake from tributaries that run from River Benue during rainy or flood season. When the season is over, the Lake separates out. The Lake is about 450m north of Gbedikere village. The water body covers about 400 – 450m and a depth of 10 – 14m deep, depending on the season.

The Lake is used for fishing and other domestic activities; consequently most of the settlers around the Lake are fishermen (Upper Benue River Basin Development Authority, 1985). The lake experience two seasonal periods; the rainy season starts in the month of May and last till October and is characterized by heavy down pour which sometimes have an extensive flood action. The dry season is from late October to April and is characterized by cold, dusty -dry wind followed by intense heat. The lake contains fish, other aquatic animals and some macrophytes such as wire grass (*Cyperus articulatus*) which are used for waving mats.

ZOOPLANKTON SAMPLING

Three sampling stations were selected on the lake for sampling marked A, B and C respectively. Results from ten (10) months sampling are reported. A standard plankton net (mouth diameter 2.5cm No. 10 silk straining net, mesh size 158 mm) was used to collect zooplankton. At each station five standard sweeps were made by oroggin the net along the water (Wually from profunda to littoral zone) for about two meters. Zooplankton-zoobenthos samples were always taken from the bottom to the surface using the plankton net. Plankton samples were concentrated into 20cm specimen bottles and immediately fixed and preserved with 5% formalin (APHA, 1985).

ENUMERATION OF ZOOPLANKTON

The study adopted a procedure by Teje and Fornado, (1986) for identification and estimation of zooplankton into various groups (Cladocera, Copepoda and Rotifer). Before enumeration each sample was centrifuged by 10ml aliquot and 1ml of the aliquot was withdrawn at a time and introduced into a country chamber using a vide-bore (3mm diameter) automatic pipet. Five sub-samples were taken from each concentrate. The second and subsequent sub-samples were taken after the previous sub-samples had been put back into the bottle. The mean number of the individual per ml was computed. Organisms' concentration was calculated from the following relationship:

$$\text{No of organisms Per Liter of water} = \frac{\text{Organism per ml concentrate} \times 1000}{\text{Vol. Of water filtered}}$$

The individual number of individual per-liter for each species per station was calculated, percentage abandon computed. Identification and enumeration was done using a vision light binocular microscope.

PHYSICO-CHEMICAL PARAMETERS

Temperature was measured in the field using the ten way temperature meter (9091 model). Water samples for dissolved oxygen were taken in a 250ml sampling bottle as was determined using Winkler method (Wetzel and Westbland, 1979; America Public Health Association, 1980). Water transparency was measured using a 20cm secchi-disk (Wetzel and Westbland, 1979).

The pH was determined in the field using potable electronic pH meter Probe Mettler Deita 320 model which had been standardized with dissolved water and butter solution shortly before used. The probe was inserted below the water surface until the readings stabilize.

RESULTS

Water temperature variation in the lake followed closely with a change in atmospheric temperature and season in Gbedikere. Variation in water temperature ranges between 25.30°C during the period of study (Table 1). There were no significant difference ($P < 0.05$) in the pattern of distribution of temperature in all the three stations measured. The lake water was well oxygerated with dissolved oxygen values between 4.80ml/c and 5.21ml/c during the study period. No significant difference was found between the mean dissolve oxygen within the stations.

Water transparency was generally low as a result of dilution caused by the inflow of water from inland effluent during the wet season. The pattern of seasonality in water transparency is similar at all stations with a range between 0.30m – 0.35m.

The homogenous nature of the water with regards to pH is reflected from the stations in the pattern of seasonal variation (Table 1). The lake was generally slightly acidic (pH below the neutral value of 7.0) with few exceptionally acidic value of 6.02, 6.03 and 6.13 in the 2nd, 3rd and the 8th month and alkaline value of above 7 in the 1st and 7th month respectively.

Table 1: Variations in Physico-chemical Parameters of Gbedikere Lake.

Month	Temperature (⁰ c)	Dissolved o ₂ (mg/l)	pH	Transparency (m)
FEB	29.3	4.80	7.00	0.331
MAR	29	4.84	6.02	0.34
APRI	29	5.21	6.02	0.34
MAY	27.3	4.86	7.21	0.35
JUNE	26.6	4.83	6.97	0.32
JULY	28	4.69	6.13	0.33
AUG	25.3	4.83	6.65	0.33
SEPT	25.6	4.80	6.03	0.31
OCT	28.3	5.02	6.42	0.33
NOV	28	5.12	6.94	0.30

Three major groups of zooplankton with varied numbers were identified at the end of the 10 months study in Gbedikere Lake. These include Rotifers 453 (48%), Cladocerans 247 (27%) and Copepods 237 (25%). Six species were identified under Rotifers, three for Cladocera and three for Copepoda.

Table 2 shows the three classes of zooplankton and available species under each class and their abundance in Gbedikere Lake. It equally summarizes the total species and percentage for easy understanding of the three classes of zooplankton and the various species identified.

Table 2: Total Percentage (%), Composition of Zooplanktons, Groups and their Species in Gbedikere Lake.

Zooplanktons	STA A	STA B	STA C	Total	Percentage (%)	% Total Composition
ROTIFERS						
<i>Asplanchna</i>	27	25	25	77	16.99%	8.21%
<i>Brachionus</i>	20	28	20	68	15.01%	7.25%
<i>Keratella</i>	33	32	24	89	19.64%	9.49%
<i>Rotatoria</i>	28	27	25	80	17.66%	8.53%
<i>Synchaeta</i>	22	22	22	66	14.56%	7.04%
<i>Proales</i>	26	24	23	73	16.11%	7.79%
Total	156	158	139	453	100%	48%
CLADOCERA						
<i>Daphnia</i>	25	28	27	80	32.38%	8.53%
<i>Ceriodaphnia</i>	29	31	24	84	34.00%	8.96%
<i>Bosmina</i>	29	29	25	83	33.60%	8.85%
TOTAL	83	88	76	247	100%	27%
COPEPODA						
<i>Calanoid</i>	24	24	16	64	27.00%	6.83%
<i>Nauplius</i>	25	24	15	64	27.00	6.83%
<i>Cyclopod</i>	37	38	34	109	45.99%	11.63%
Total	85	86	65	237	100%	25%
Grand Total				937		100%

STA = Station

DISCUSSION

The result obtained from the study shows variation and dynamism among various species of zooplankton, which calls for further monitoring. Twelve species of zooplankton were identified in the lake. Table 2 shows the group of zooplankton, their species availability and number identified in the lake, it equally shows the total number of species and the percentages of various groups of zooplanktons, the groups of zooplanktons identified are Rotifera, Copepoda and Cladocera. The highest percentage of Rotifera found could be because of its wide range in Nigeria and as it has the shortest life cycle with peak reproductive period, life span is 12 days at 20°C and 5 days at 25°C (Eya, 1999). The following were identified; Cladocera (*Monia sp*, *Diaphanosoma sp*, *Bosmina sp*, *Ceriodaphnia sp*). Rotifera (*Filinia sp*, *Brachionus sp*, *Lecane sp*, *Polyarthra sp*, *Asplanchna sp*, *Tricocerca sp*, *Keratella sp*). Copepoda (*Copepodites sp*, *Thermocyclops sp*, *Tropodiatomus sp*, *Mesocyclops sp*) (Jeje and Fornado 1986).

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Received for Publication: 17/03/2009

Accepted for Publication: 13/05/2009

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